

# DISTRIBUTION AND BIOLOGY OF FLIGHTLESS CARRION BEETLE *NECROPHILUS PETTITII* IN EASTERN NORTH AMERICA (COLEOPTERA; SILPHIDAE)<sup>1</sup>

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**ABSTRACT:** Data are given on the life cycle, seasonality, habitats, and distribution of *Necrophilus pettitii* Horn, and a lectotype is designated.

The preparation of reviews of North American silphid carrion beetles (Miller and Peck, 1979; Peck 1982, Peck and Miller, 1982) has shown the need for the presentation of data on poorly known species. One of these is *Necrophilus pettitii* Horn, 1880, a flightless species and the only eastern North American representative of the tribe Agyrtini. The few scattered literature records show a wide but incompletely known distribution and poorly known biology. The following is offered to help correct this.

The species may be characterized as follows: size about one cm in length; body broadly oval and flattened; color shining brown or reddish brown; pronotum broad, marginally flattened and punctured; elytra non-truncate, covering abdomen, with nine deeply punctate striae; abdomen with five visible sternites; tarsal formula 5-5-5; antennae eleven segmented, club gradually clavate, last five segments covered with microsetae.

Detailed studies by A.F. Newton (in manuscript) show that the tribe, combined with Lyrosomini, should be elevated to family status, based on adult and larval characters. Data on larval characteristics will be given by Newton.

A type specimen has never been published, and the following is designated in the interest of stability of nomenclature.

*Necrophilus pettitii* Horn (1880: 243). **LECTOTYPE** (here designated), a female with white label "Can" and white label "646" and red ANSP label "lectotype 3006" and white label "N. Pettitii Horn" and my designation label. Also one female paralectotype with white label "Ky" and green label "paratype 3006"). Both in Horn collection, MCZ, Harvard Univ. The localities published with the description were Canada and Kentucky. The larger series of 3 (two additional paralectotypes in LeConte collection, MCZ) were from Grimsby, Ontario, Canada, which is here designated the type locality (see Horn, 1868: 125. and Pettit, 1869).

Life cycle characteristics have been determined by Dr. J.A. Payne, who has generously provided the following data: Five adults (2 pairs in

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copulo), were collected from deer mouse (*Peromyscus leucopus*) feces at Perry, Georgia, on 7 December 1969. The adults were kept in a cool basement in a large screen-covered container. They were offered decaying squirrel meat and mouse feces, but no evidence of feeding was observed. Approximately 20 small larvae were noticed on 14 December, giving a maximum of 7 days for the eggs to be laid, mature, and hatch. Larvae fed primarily on the mouse feces, but also on the squirrel meat. Some larvae were preserved. New adults appeared on 1 February, 1970, indicating a maximum egg to adult development time of 8 weeks, at temperatures from 13° to 19°C. The original adults lived about 6 weeks in culture.

The records show that the species is collected in forested habitats, most frequently in the higher elevations of the southern Appalachians in the summer months. At lower elevations the records more frequently show activity in the cooler spring and fall months. The species is most often taken on decomposing material, usually on or in dung and carrion baits or pit traps. It is probably nocturnal, hiding in deep litter or in the soil (judging from the lack of records from general hand collecting, and from the number of records in cave entrances where the soil fauna can often be sampled with comparative ease).

The general distribution is from New York, Ontario, and Michigan, southwards to Alabama, Georgia, and northern Florida.

The following distribution records are based on material in the author's collections or in museums, abbreviated with standard usage following Arnett and Samuelson (1969). The data of Davis (1980) are not repeated here.

Canada. Ontario. Grimsby (type locality) Sept. and Oct., on decaying fungi on logs. J. Pettit (Horn and LeConte collections, MCZ) (Horn, 1868, 1880; Pettit, 1869).

United States. Alabama. Jackson County. Russell Cave National Monument, Pig Entrance of Russell Cave, 17.VIII.1967, S. Peck and A. Fiske, 1 on carrion bait. Jefferson County. Birmingham, 8.IV.1953, 2; 11.IV.1955, 1 on rotten fish; 12.IV.1955, 1; 14.IV.1955, 1; all by H.R. Steeves (FMNH). Tallapoosa County. Cheaha Mountain (State Park), 7.VI.1940, W.B. Jones, Museum Expedition, 4 (UANH). Tuscaloosa County, 1935, A.F. Archer, 1 (UMMZ).

Georgia. Dade County. Cloudland Canyon State Park, 15-23.V.1972, S. Peck, 1 in forest carrion trap. Fulton County. Atlanta, 15.III.1938, P.W. Fattig, 1 (MCZ). Houston County. Perry, 7.XII.1969, J.A. Payne, 5 on mouse feces; 4.II.1970, J.A. Payne, 5 lab reared on mouse feces.

Illinois. Jackson County. Carbondale, 19.V.1971 (Baldwin, 1971: 19).

Indiana. Posey County. Grand Chain, 10.IV.1901, W.S. Blatchley, 2 on ill-smelling decaying fungi beneath log (PURC; Blatchley, 1910).

**Kentucky.** Edmonson County. Mammoth Cave National Park, Running Branch Cave, 5-26.V.1972, S. Peck, 4 on carrion baits; 7-26.V.1972, S. Peck, 2 in forest dung traps at maintenance area; Wilson Cave, 17.VI.1973, S. Peck, 1 on animal dung. Powell County, 5.IX.1958, 1 (FSCA).

**Michigan.** Oakland County, 1.V.1924, A.W. Andrews, 1 female missing head and prothorax (MSUC).

**New York.** Cattaraugus County. Allegheny State Park, July (Leonard, 1926); 15.VII.1938, 1 (USNM); 7.X.1936, M.J. Ramsey, 1 (USNM). Sullivan County. Cooks Falls, Sept., (Leonard, 1926). Westchester County. Armonk. Calder Conservation and Ecology Center of Fordham Univ., April, 1; May, 3; June, 3; October, 2; November, 1 (Pirone, 1974: 290).

**North Carolina.** Buncombe County. Asheville, April, May, June, 1928, 6 (MCZ). Haywood County. Cataloochee Divide, 9.VI.1940, 5000', C.A. Frost, 2 (MCZ). Mt. Pisgah, 12.IX.1934, Quirsfeld, 1 (MCZ). Mt. Sterling, Oct. 1938, W.B. Jones, 19 (CUIC). Sunburst, 25.X.1934, D. Dunavan, 1 (AMNH). Richland Balsam, 7-26.VIII.1965, 6000', S. Peck, 2. Henderson County. Hendersonville, 12.VI.1951, H. and A. Howden, 1, traps. Jackson County. Balsam, 7.VI.1962 (1), 2.XI.1958 (1), W. Rosenberg (CAS). Macon County. Aquone (Brimley, 1938). Highlands, no data, 2 (MCZ). McDowell County. Linville Falls, May, June (Brimley, 1938). Mitchell County. Spruce (Brimley, 1938). Swain County. Cherokee Orchard, 7.X.1960, 1, T.C. Barr. NE slope Mt. Collins, 17-22.V.1972, 5900'. A. Newton, 17 in carrion trap 452. Smokemont, 1939, W.B. Jones, 21 (CUIC). Wake County. Raleigh, March, November (Brimley, 1938): 21.X.1950, H. and A. Howden, 2 on chicken feathers. Yancey County. Mt. Mitchell (Black Mts.), 4.IX.1930, 5000-6711 ft., C. Banks, 1 (MCZ).

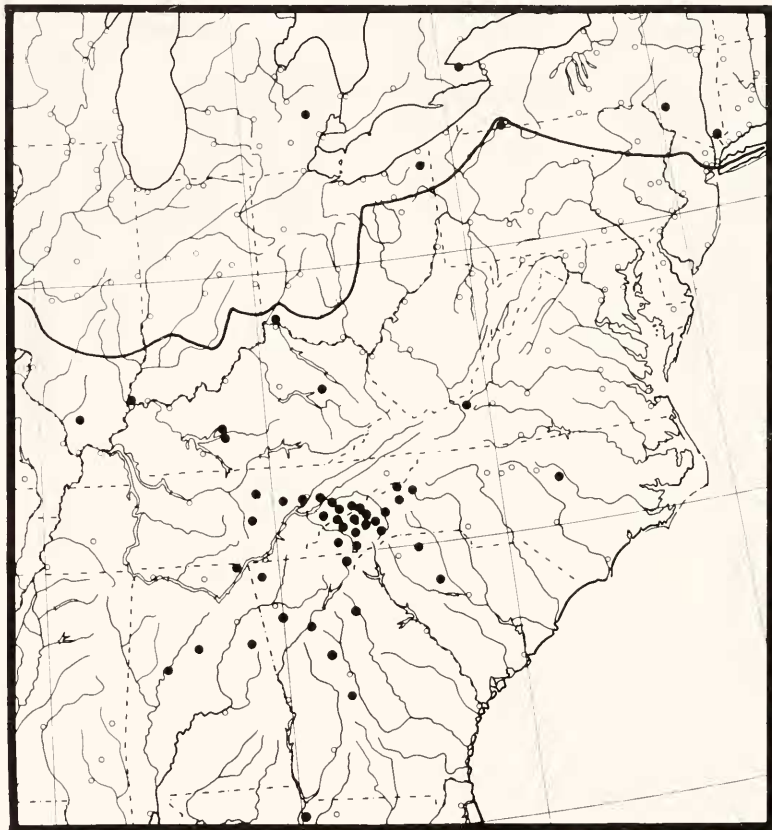
**Ohio.** Ashtabula County. Jefferson, no data, 3 (FMNH, ICCM). Hamilton County. Cincinnati, 20.X.1903, 1 (USNM); 25.X.1903, 1 (SEMC); 1.X.1926, 3 (USNM); 4.X.1920, 4 (CMNH); no data, 5 (CAS, USNM).

**South Carolina.** Newberry County. Newberry, Oct. (Kirk, 1970). Oconee County. Clemson College, 10.IV.1933, 1 (CAS); Clemson, Apr., May (Kirk, 1970); Feb., (1), Mar. (2), May, Sept. (1), Nov. (4), Dec. (3). J.A. Payne, on carrion (pig, 5; chicken, 1; frog, 2; squirrel, 3) in advanced decay state (Payne and King, 1970). Spartanburg County. Spartanburg, 10.III.1961, A.C. Bass, 1, (USNM).

**Tennessee.** Anderson County. Oak Ridge, 20.II and 14.III.1965, J.A. Payne, 7 on mouse feces and bodies. Oak Ridge, cave 4 mi. S. Sept. 1972, J.A. Payne, 2 on dead mouse 100' inside cave. Cumberland County. 3 mi. W. Ozone, 1700', 17.VI-14.VII.1972, A. Newton, 1 in hardwood forest dung and 1 in carrion trap. Knox County. Univ. Tennessee Farm, Feb. and March, 1972, H.B. Reed, 7 (USNM) with carcasses in late dry state (Reed, 1958). Putnam County. Quinland Lake, 17.I.1960, T.C. Barr, 1. Sevier County. Gatlinburg (Rainbow Motel), 17-23.V.1972, 1400', A. Newton, 2 in carrion trap 456; 5 mi. S. Gatlinburg, 17-22.V.1972, 2300', A. Newton, 6 in carrion and 1 in dung traps 455; 8 mi. S. Gatlinburg, 17-22.V.1972, 3100', A. Newton, 19 in squid carrion traps and 10 in human dung traps; 13 mi. S. Gatlinburg, 17-22.V.1972, 4500', A. Newton, 2 in carrion trap 453. Great Smoky Mountains National Park: Mollies Gap, 6-26.VIII.1965, S. and J. Peck, 2 in carrion trap; 18.VI.1955, 6000', H. Howden, 1 in malt trap; Cherokee Orchard, 2500', 20-27.V.1977, A. Newton and M. Thayer, 14 on squid bait. Greenbriar Cove, 20.IV.1954, 2000', 1, H. Howden; 1700', 19-23.V.1972, A. Newton, 1 in human dung trap; Ramsey Cascade Trail, 18-23.V.1972, 27-2900', A. Newton, 10 in human dung and 4 in carrion traps 457-8; 2.VII.1955, 5500', H. Howden, 2 in malt trap; Porters Creek Trail, 2600', 22.V.1977,

A. Newton, M. Thayer, 4 on carnivore scats. Clingmans Dome, 1947, Dietrich, 2 (CUIC); 6-26.VIII.1965, summit, S. Peck, 9 in carrion trap; 3-9.IV.1967, 6000', S. Peck, 1 in carrion trap. Swain County. Mt. Collins (GSMNP), 5900', 17-22.V.1972, A. Newton, 13 in squid bait and 5 in human dung bait traps. Warren County. McMinnville, Cumberland Caverns, 15-24.V.1972, S. Peck, 2 in forest dung trap.

Virginia. Giles County. Mountain Lake, 24-30.VI.1968, 3500', S. Peck, 3 in forest carrion trap.



Map of part of eastern North American showing known localities (solid, black dots) for *Necrophilus pettitii*. The localities listed by Davis (1980) are included. (Small, open circles indicate locations of major cities.) Dark line indicates maximum extent of the Wisconsin glacial ice sheet. The species has made modest northward range movements since deglaciation.

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## LITERATURE CITED

- Arnett, R.H., Jr., and G.A. Samuelson. 1969. Directory of Coleoptera collections of North America (Canada through Panama). Dept. Entomology, Purdue University, Lafayette, Indiana. 123 pp.
- Baldwin, B. 1975. A faunal study of Illinois Silphidae (Coleoptera). Unpublished M.S. Thesis, Eastern Illinois University, Charleston, Illinois. 45 pp.
- Blatchley, W.S. 1910. An illustrated descriptive catalogue of the Coleoptera or Beetles (exclusive of the Rhyncophora) known to occur in Indiana. Nature Publishing, Indianapolis. 1386 pp.
- Brimley, C.S. 1938. Insects of North Carolina. North Carolina Dept. Agric., Division of Entomology, Raleigh. 560 pp.
- Davis, L.R., Jr. 1980. Notes on beetle distributions, with a discussion of *Nicrophorus americanus* Olivier and its abundance in collections (Coleoptera: Scarabaeidae, Lampyridae, and Silphidae). Coleop. Bull., 34: 245-251.
- Horn, G.H. 1868. Catalogue of Coleoptera from south western Virginia. Trans. Amer. Ent. Soc., 2: 123-128.
- Horn, G.H. 1880. Synopsis of the Silphidae of the United States. Trans. Amer. Ent. Soc., 8: 219-322.
- Kirk, V.M. 1970. A list of the beetles of South Carolina. Part 2, Mountain, piedmont, and southern coastal plain. Tech. Bull. 1038, Agric. Exp. Sta., Clemson Univ., Clemson. 117 pp.
- Leonard, M.D. 1926. A list of the insects of New York, with a list of spiders and certain other allied groups. Cornell Univ., Agric. Exp. Sta. Mem. 101. 1121 pp.
- Miller, S.E. and S.B. Peck. 1979. Fossil carrion beetles of Pleistocene California asphalt deposits, with a synopsis of Holocene California Silphidae (Insecta: Coleoptera: Silphidae). Trans. San Diego Soc. Natur. Hist., 19: 85-106.
- Payne, J.A. and E.W. King. 1970. Coleoptera associated with pig carrion. Ent. Mon. Mag., 105: 224-232.
- Peck, S.B. 1982. Silphidae and the associated families Agyrtidae and Leiodidae, in D. Dindal, ed., Soil Biology Guide. Wiley and Sons, in press.
- Peck, S.B. and S.E. Miller. 1982. Family: Silphidae. in: J. Kingsolver, ed., A catalogue of the Coleoptera of American north of Mexico. U.S. Dept. Agric., handbook no. 529-28, in press.
- Pettit, J. 1869. Notes on a few beetles. Can. Ent., 2: 20.
- Pirone, D. 1974. Ecology of necrophilous and carophilous Coleoptera in a southern New York woodland (phenology, aspection, trophic and habitat preferences). Unpublished Ph.D. Thesis. Fordham University, N.Y., N.Y. 769 pp.
- Reed, H.B., Jr. 1958. A study of dog carcass communities in Tennessee, with special reference to the insects. Amer. Midl. Natur., 59: 213-245.